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DAYTIME PHOTOELECTRIC MEASUREMENT OF CLOUD HEIGHTS

"Ceiling-zero" is one of the most dangerous hazards to aviation. The height of the ceiling and information concerning the rate at which it is rising or falling above an airport are of particular interest to the pilot who is scheduled to land there within an hour or so. In the United States and Canada, the meteorological services use "ceiling projectors" to determine the height of clouds at night. An intense beam of light from a projector forms a very conspicuous spot on the base of the cloud directly above it. An optical instrument is used to measure the angle between the line of sight on the spot and the line of sight on the projector. This angle of elevation of the spot, together with the known distance between the optical instrument and the projector, permits the calculation of the height of the cloud ceiling by simple trigonometry.

During the daytime, however, the clouds are so bright that the spot is not visible, and hence the usual optical instrument cannot be used to measure the angle. Modulating the beam from the projector, that is, breaking it up into short, evenly spaced pulses of light, has made it possible to detect the reflected signal light with a photoelectric tube and amplifier. These were designed to respond only to that component of the total light received from the clouds which has the characteristic pulses introduced into the projected beam. Thus the projected signal light, after reflection, is sorted out from the background light of the cloud. In use, the photoelectric detector scans the base of the cloud until the meter on the amplifier indicates that the modulated signal light is being received. The angular setting of the detector then corresponds to the angular elevation of the spot on the cloud. Two members of the Bureau's Electricity Division, Maurice K. Laufer and Laurence W. Foskett, have developed this equipment for the United States Weather Bureau, and the project was financed by that agency. During the daytime, cloud ceilings as high as 9,000 feet have been detected.

[1] Published with approval of the Director of the Budget.

MAGNETIC SATURATION INDUCTION OF IRON

The magnetic saturation induction of a ferromagnetic material is the limit of the intrinsic magnetization theoretically possible by the application of a magnetizing force of infinite intensity. The value is of interest primarily from the point of view of the theory of ferromagnetism. One of the principal obstacles heretofore encountered in the determination of the saturation value of iron has been the difficulty of obtaining iron of a sufficiently high degree of purity. It has also been hard to obtain a satisfactory degree of accuracy in the magnetic measurements.

Several ingots of exceptionally pure iron have recently been prepared at the Bureau. The total amount of the impurities determined by the best available methods of analysis is of the order of 0.01 percent. R. L. Sanford and E. G. Bennett have made magnetic measurements on several specimens from these ingots, and special precautions have been taken to obtain the highest possible accuracy.

In a report (RP1354) in the January Journal of Research, the methods by which the measurements were made are described. The value reported for the magnetic saturation induction of pure iron at 25° C is 21.58±0.01 kilogauss.

THERMAL EXPANSION OF ELECTROLYTIC CHROMIUM

An investigation of the linear thermal expansion of electrolytic chromium has recently been completed by Peter Hidnert. A total of 15 tests was made on two samples (99.3 and 98.7 percent of chromium) at various temperatures between −105° and +715° C with a precision comparator method and with an interference method.

During the first heating or heatings, when hydrogen presumably was being evolved, the samples contracted in an irregular manner. After a few heatings, however, the irregularities disappeared and smooth expansion curves were obtained.

After the first heating to 500° C and cooling to room temperature, the 99.3 percent sample was 1.1 percent shorter than the initial length before heating. The density of this sample increased 2.4 percent and the volume decreased 2.3 percent, after three cycles of heating to 500° C and cooling to room temperature.

The linear thermal expansion of electrolytic chromium is a function of the temperature, hydrogen content or liberation, time and rate of heating, previous treatment, etc., during the first heating or when irregularities (contraction) occur.

Equations for calculating the instantaneous coefficient of expansion and the length at any temperature between −100° and +700° C, and other details of the work will be found in RP1361 in the Journal of Research for January. The following table gives average calculated coefficients of expansion:

Temperature range	Average coefficient of expansion per degree centigrade
°C	×10⁻⁶
−100 to 0	5.1
0 to 100	6.6
0 to 200	7.3
0 to 300	7.9
0 to 400	8.4
0 to 500	8.8
0 to 600	9.1
0 to 700	9.4

PREPARATION OF *d*-MANNOSE

The methods heretofore used for preparing *d*-mannose from ivory-nut shavings are not entirely satisfactory. Under most conditions, the sugar is relatively difficult to crystallize, and the prior methods have involved the preparation of intermediate compounds or the use of glacial acetic acid as a solvent. In a process devised by Horace S. Isbell, the sugar is crystallized from a mixture of methyl and isopropyl alcohols. As explained in the Journal of Research for January (RP1357), the improved method is suitable for large-scale application and gives a yield of about 35 percent.

HYDROLYSIS OF TURANOSE

Turanose (3-*α*-*d*-glucopyranosido-*d*-fructose) differs from the more common disaccharides in that the glycosidic union is on the carbon adjacent to the reducing group. The proximity of the reducing group influences the stability of the glycosidic union and causes the disaccharide to be particularly susceptible to alkaline hydrolysis. On treatment with lime water, turanose undergoes hydrolysis rather than a normal Lobry de Bruyn interconversion. In the presence of oxygen, in alkaline solution, the sugar is hydrolyzed in large measure and the resulting glucose and fructose are oxidized to arabonic acid. On

the other hand, lactulose (4-β-*d*-galactopyranosido-*d*-fructose) is relatively stable to alkaline hydrolysis; and when treated with oxygen in solution containing potassium hydroxide, it yields the salt of a disaccharide acid, presumably 3-β-*d*-galactopyranosido-*d*-arabonic acid. The difference in the behavior of the two sugars illustrates the importance of the location of the glycosidic union in relation to the behavior of the sugars in alkaline solution. The location of the glycosidic union also affects the amount of reduction with alkaline copper reagents. In the January Journal of Research (RP1356), Horace S. Isbell reports copper-reducing values for turanose at several concentrations, as obtained by the Munson-Walker method.

SURFACE CHARACTERISTICS OF COTTON FIBERS

Natural cotton is composed of a primary and a secondary wall. The former forms a thin sheath on the surface of the fiber and is composed principally of small amounts of cellulose imbedded in a membrane of wax and pectic substance. The latter is composed chiefly of cellulose and forms the main body of the fiber. The pectic substance, although present to the extent of only approximately 1 percent, accounts for 85 percent of the total acidic groups of the mature fiber. The highly acidic nature and the location of this substance in the naturally occurring fibers would be expected to influence greatly a number of the properties of the fibers, especially those dependent on surface characteristics. These surface characteristics are of considerable importance in a number of industrial processes—such as, for example, the scouring, dyeing, and finishing of textile materials.

Since the electrophoretic technique has been shown by research associates for the Textile Foundation at the Bureau to be a useful tool for characterizing other fiber surfaces, it appeared advisable to apply it to an investigation of the cotton fiber as well. As shown in a report by Arnold M. Sookne and Milton Harris (RP1359 in the January Journal of Research), samples of dewaxed cotton, cotton which had been depectinized by treatment with a boiling 1-percent solution of sodium hydroxide for various lengths of time, and pectic substance from cotton gave widely different pH-mobility curves. The curve for pectic substance is characteristic of a highly acidic substance, whereas that of depectinized cotton appears to be a composite of the curves for cellulose and pectic substance.

The purified cellulose exhibits a reversal of charge below pH 2.5, and accordingly is isoelectric at that pH. It is shown that the reversal of charge has not resulted from irreversible changes produced in the fiber during immersion in the dilute solutions of acid used in the present investigation.

COMBINATION OF SILK FIBROIN WITH ACID AND WITH BASE

Silk contains a number of acidic and basic groups. Their state of combination and behavior are important in influencing the tensile and elastic properties of the fibroin and the adsorption of moisture and dyes.

As part of the program of the Textile Foundation Research Associateship at the Bureau, the relationship between the quantities of hydrochloric acid and potassium hydroxide taken up by fibroin from solutions, and the concentrations of those solutions, were investigated. The effect of added potassium chloride was also studied. In general, it has been possible to correlate the several parts of the titration curves of proteins with their amino acid contents, but knowledge of the role of the phenolic hydroxyl groups of tyrosine has always been limited. Silk fibroin, however, contains such a large proportion of tyrosine as practically to assure an indication of the role of the phenolic hydroxyl groups of tyrosine simply by the magnitude of the base-binding capacity. In order to investigate more carefully the part taken by these groups, Leland F. Gleysteen and Milton Harris have obtained a titration curve for methylated fibroin, in which most of the hydroxyl groups have been converted into nonreactive methoxyl groups.

The component parts of the titration curve of silk fibroin have been interpreted in terms of the composition of this protein. Thus, the hydroxyl groups of tyrosine appear to bind base, as shown by the fact that the base-combining capacity is much greater than can be accounted for by the other groups which are able to bind base.

The presence of free carboxyl groups in silk fibroin is suggested by the shape of the titration curve. From the maximum amount of acid bound, an estimate of the total content of free amino groups may be obtained. The effect of added salt is similar to that obtained with other insoluble proteins—namely,

to increase the quantity of acid or base bound at a given pH, in a manner which suggests that the combination of hydrogen ions is affected by the concentration of anions as well as by the concentration of hydrogen ions and that combination with hydroxyl ions is affected by the concentration of cations.

A complete account of this work will appear in the January Journal of Research as RP1360.

MICROSCOPIC STRUCTURES OF PORTLAND CEMENT CLINKER

The interest of producers of portland cement in the phase composition of their product has resulted in two procedures for its calculation from chemical analysis. One procedure assumes complete crystalline equilibrium, while the other makes allowance for residual glass. In a paper (RP1358 in the January Journal of Research) by George W. Ward, of the Portland Cement Association Fellowship at the Bureau, 10 portland cement clinkers, reheated and cooled at various rates, were quantitatively analyzed with the microscope for the phases present. The appearance of the clinker phases after different heat treatments is described and the resulting clinker structure is discussed. In general, agreement was good between the amounts of phases observed and those calculated to be present by various methods. The phase compositions, as calculated with consideration of glass, agreed better, as a rule, with the microscopically determined compositions than did those in which the calculations were based upon the assumption of complete crystalline equilibrium. The glass determined microscopically and the values obtained from the heat-of-solution method agreed better for slowly cooled and plant-cooled clinkers than for those which had been cooled quickly.

MEASUREMENT OF SPECIFIC SURFACE BY AIR PERMEABILITY

The specific surface of powders was recently determined by R. L. Blaine by measuring the air permeability of a bed of the material, using the apparatus and method of test described by Lean and Nurse. Tests to determine the reproducibility of results obtained on portland cement by different operators and the applicability of the apparatus to other materials showed that it is relatively simple to operate, the test procedure is fast, and the results are reproducible. The fineness of mixtures of two or more components of different densities can be determined, and although the apparatus is well adapted to measuring the specific surface of materials in the range of fineness of portland cement, it can be used for finer materials as well. The values of specific surface obtained with the air-permeability apparatus were from 1.5 to 1.9 times the values obtained with the Wagner turbidimeter.

STUDY OF GARNET-HYDROGARNET SERIES

Because portland cement is largely composed of calcium silicates and aluminates, with smaller amounts of a ferrite, it was once customary to assume that a hydrated calcium aluminosilicate was formed during the setting of cement. This supposition appeared to lose its validity during the past two decades, when studies of the reactions between the individual cement compounds and water indicated that the aluminate and silicate compounds gave separate and distinct hydrates. However, a recent study by E. P. Flint, H. F. McMurdie, and L. S. Wells, reported in the Journal of Research for January (RP1355), indicates that the earlier postulation of the formation of an aluminosilicate was not entirely ill-founded.

This investigation has disclosed that the well-known compound $3CaO.Al_2O_3.6H_2O$, one of the easily recognized constituents of set portland cement, can form complete solid solutions with the related compound, $3CaO.Fe_2O_3.6H_2O$, and also with grossularite garnet, $3CaO.Al_2O_3.3SiO_2$, and andradite garnet, $3CaO.Fe_2O_3.3SiO_2$. All these compounds, as well as intermediate solid solutions, were synthesized by hydrothermal methods.

The structures of the various members of the series were determined by X-ray studies, and those of the synthetic garnets were found to agree closely with those of the naturally occurring minerals.

Included in the series were: (1) One of the principal products of hydration of tetracalcium aluminoferrite, (2) the major product of hydration of the glass phase in portland cement clinker at elevated temperatures and pressures, and (3) the naturally occurring mineral plazolite, $3CaO.Al_2O_3.2SiO_2.2H_2O$.

BOND STRESS IN CONCRETE REINFORCING BARS

Although plain concrete has a relatively low tensile strength, it becomes

an excellent structural material when reinforced with properly placed steel bars; these bars then carry the tensile stresses which are transmitted to them from the concrete by virtue of the adhesion or bond between the two materials. The primary importance of bond between concrete and steel was early recognized, and numerous competent observers have investigated its characteristics. However, because of the difficulty of studying the behavior of steel embedded in concrete, most of these investigations have been confined to the performance of reinforced concrete specimens as a whole, rather than to the state of stress existing in the reinforcing steel. Valuable contributions to better understanding of bond stresses were made by Glanville, who observed the strains produced on the interior surfaces of smooth steel tubes embedded in concrete, and by Gilkey, Chamberlin, and Beal, who estimated the stresses in reinforcing steel by observing the strains on the surfaces of the surrounding concrete as loads were applied to the steel bars.

An investigation recently undertaken by David Watstein at the Bureau represents an attempt to measure directly the stresses in a reinforcing bar embedded in a concrete cylinder, during a pull-out test.

The investigation included tests of eighteen 6- by 18-in. cylindrical, concrete pull-out specimens containing ¾-in. diameter steel bars. Each specimen had 12 openings, ¼ in. in diameter which exposed the steel bars and permitted the direct measurement of tensile stress. In a similar series of 18 solid specimens, only the over-all elongations of the embedded bars were measured; these specimens provided a check both as to the strength and the computed elongations of the bars in the perforated pull-outs. The six types of reinforcing bars tested included four types of commercial deformed bars, a hot-rolled plain bar, and a smooth cold-rolled bar.

The bond stress at the loaded end of the bar varied approximately linearly with the tension in the bar, for all types of bars except the smooth cold-rolled steel. The variation of bond stress with the distance from the free end of the bar was nearly the same for all four types of deformed bars; the maximum bond stress existed at the loaded end of the bar for all loads, while the bond stress tended to become uniform along the half of the embedded bar adjacent to the free end as the applied loads approached the maximum values. The bond stress for plain hot-rolled bars varied in a manner similar to deformed bars for loads producing initial slip at the free end; for loads approaching the maximum value, the bond stress was a minimum at midlength, while the bond stresses were nearly equal at both ends of the bar. The smooth cold-rolled bar developed the maximum bond stress at the free end for maximum applied load, while for lower loads (before initial slip at the free end) the bond stress was greatest at the loaded end.

EFFECT OF WETTING AND DRYING ON PERMEABILITY OF MASONRY WALLS

Since changes in volume are produced in some masonry units and most mortars by changes in their moisture content, the wetting and drying of masonry walls may produce differential volume changes, which result in the formation or enlargement of cracks in the joints. The effects of wetting and drying masonry walls were studied by measuring the permeability of eight walls, each about 40 inches long and 50 inches high. Five of the walls were of all-brick construction, one was a stucco-faced wall, and two were faced with brick and backed with hollow units. The walls were subjected to about 12 cycles of wetting and drying. They were wetted by applying water and an air pressure of 10 lb/ft^2 to the exposed face. The walls were not exposed to freezing and thawing, and changes in their linear dimensions were not restrained by adjacent structural members. No significant change in the permeability of the walls resulted from the exposure to wetting and drying.

This investigation is fully described in Building Materials and Structures Report BMS55. Copies can be obtained at 10 cents each from the Superintendent of Documents, Government Printing Office, Washington, D. C.

PAINTS FOR EXTERIOR MASONRY

Special paints are often used on exterior walls of porous masonry to keep out moisture and to give them an attractive finish. The Bureau is studying the behavior of these masonry paints, as part of the general research program on construction materials and methods for low-cost housing. To facilitate the work, a test field has been built where masonry paints can be applied under practical working conditions, after

which a careful watch can be kept to determine the effects of exposure.

The materials used in constructing the test walls include new and used common brick, cinder block, expanded blast-furnace slag block (Pottsco), concrete block, cast-in-place concrete, and cement-asbestos siding. The walls are vertical and face north and south. The painting surface of the walls is from 11 to 11.5 square feet, with the exception of the ones on which cement-asbestos siding was used; these measure approximately 32 square feet.

Commercial brands of oil and varnish paint, emulsified synthetic resin paints, chlorinated rubber coatings, rubber emulsion paints, and cement-water paints have been applied to each type of test surface. The use of cement-sand grout coat as a base on open-joint and extremely porous walls, and the efficiency of rubber primers on "green" walls are being given particular attention in the painting procedures and in the study of the compatibility of dissimilar paint coatings.

The hiding power and color of the paints were determined by instruments at the time of painting, and changes in these properties are being followed by monthly measurements made with a portable reflectometer. The spreading rate, brushing properties, drying characteristics, and recoatability were also recorded for each paint on each type of surface. The relative moisture content of the walls at the time of painting and from time to time afterward is determined with a "moisture meter."

In addition to the 193 test walls now undergoing exposure, a small house (10 by 12 ft.) with single walls of 8- by 8- by 16-inch three-cell cinder block and an exposed chimney of common brick is being used for further study of masonry coatings under service conditions.

AIR HUMIDITY IN HOUSES

During the past few years the public has become interested in the subject of the humidity of the air in occupied houses. It has long been known that during cold weather the relative humidity in a heated house may be very low, and most people are familiar with the effects of such low humidities in drying out furniture and woodwork. Many devices for increasing the humidity in houses have been made and their use advocated, and much of the popular interest in the subject has doubtless reulted from selling campaigns. However, very little definite information has been available concerning conditions actually prevailing in occupied houses.

To obtain trustworthy data, a humidity survey was made by the Bureau. Measurements of relative humidities in a number of houses in each of 26 localities in the northern part of the United States were made during the first part of the year 1938. The results of this survey have been published as Building Materials and Structures Report BMS56. As was to be expected, the interior relative humidities are low when the outside temperature is low, and they rise when the outside temperature rises. The air in an occupied house has, however, a considerably higher moisture content than the outside air, because of the moisture supplied by various sources within the house. The survey also indicates that many of the humidifying devices in use produce very little effect.

Copies of this report are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C. The price is 10 cents.

SURVEY OF ROOFING IN THE UNITED STATES

In an effort to obtain a general picture of roofing practices and conditions throughout the country, a questionnaire was circulated to 148 field offices of the Home Owners' Loan Corporation and Federal Housing Administration in 48 States and the District of Columbia. Building Materials and Structures Report BMS57, just released, summarizes the combined results of these replies.

The questionnaire covered the following items: Distribution, durability, unsuitability, and restrictions of various roofing materials; customary roofing practices; materials for nails, valleys, flashings, gutters, and downspouts; causes of premature roof failures; and the use of new types of roofing materials.

Information obtained by this method is intended to supplement the field surveys reported previously in the Building Materials and Structures series (BMS6 and BMS29).

The data represent the opinions of the persons who filled in the questionnaire; in most cases, these were carefully considered opinions of qualified observers who were familiar with local roofing practices, usually through previous experience in the architectural, building, roofing, or real-estate fields.

The price of BMS57 is 10 cents. Copies are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C.

ADHESIVES FOR FLOOR COVERINGS

Adhesives for bonding linoleum and other floor coverings to subfloors have been studied at the Bureau as part of the building materials research program. In locations where complete coverage of the floor space is desired, it is advantageous to bond some types of floor coverings to the subfloor. It is well known that a failure in the bond will cause almost any floor covering to become prematurely unserviceable. Failure of a bond may result from an unclean or wet condition of the subfloor, separation in an underlay, a faulty adhesive or method of installation, or from excessive dimensional changes of a floor covering with changes in relative humidity and temperature. In general, no difficulty is experienced in making satisfactory installations on subfloors which are dry, even, rigid, and clean. It has not been established, however, that satisfactory installations of such floor coverings as wood, linoleum, rubber, and felt base can be made over concrete subfloors which are damp or which may become so. Installations of asphalt tile with asphaltic cements have met with fair success where moisture conditions are not severe. In locations where drainage conditions are poor and considerable dampness is likely to prevail, it would be advisable to waterproof concrete floors which are in contact with the ground. This can best be done at the time of construction.

Tests were made to determine the resistance of a variety of adhesives to both a straight pull and a stripping pull when used to bond ⅛-inch battleship linoleum to concrete, wood, and metal. Specimens were tested in a dry condition and after exposure to moisture. Pieces of linoleum bonded to concrete slabs with selected adhesives and primers were inspected periodically during exposure to moisture.

Lignin paste, which is much lower in cost than most other floor-covering adhesives, appears satisfactory for bonding such floor coverings as linoleum, rubber, and felt base to subfloors in dry locations.

None of the adhesives tested showed adequate resistance to moisture to be satisfactory for bonding linoleum to basement subfloors where moisture conditions are prolonged or severe.

Building Materials and Structures Report BMS59 contains the complete account of this work. Copies are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 10 cents each.

COMMERCIAL STANDARD FOR HARDWOOD STAIR TREADS AND RISERS

Commercial Standard CS89–40, which has just been released, comprises grading rules and a minimum specification for three grades of hardwood stair treads and four grades of hardwood stair risers. These rules were drafted and adjusted by the trade with the cooperation of the Bureau.

Hardwood stair treads and risers have been used by the building trade for a great many years, but no nationally recognized standard grading or inspection rules had been available. Realizing the need for such rules, the Hardwood Dimension Manufacturers Association requested the Bureau's cooperation in establishing a commercial standard.

The three standard grades of treads and four grades of risers are such that they will harmonize with standard grades of hardwood flooring and solid hardwood wall paneling and trim.

The standard also covers seasoning, workmanship, tread nosing pattern, dimensions, tolerances, nomenclature, and definitions and includes a certification plan, whereby producers may guarantee that their product conforms to or exceeds the requirements of the commercial standard.

In order to keep the commercial standard up to date, a representative committee of manufacturers, distributors, and users will from time to time give consideration to its revision. The personnel of this committee is listed in the printed pamphlet, which also includes a brief history of the project and a list of organizations and individuals who have indicated their acceptance of the standard, which became effective for new production on October 10, 1940.

Copies of CS89–40 are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 5 cents each.

COMMERCIAL STANDARD FOR DOUGLAS FIR PLYWOOD

Printed copies of Commercial Standard CS45–40 Douglas Fir Plywood (Domestic Grades) (Fourth Edition), which has been in effect since

August 20, 1940, are now available. This revision includes a number of changes which bring the Standard up to date with progress in the industry.

Plywood is one of the oldest products manufactured from lumber, having been used to a limited extent by the ancient Egyptians and Chinese. However, its present versatility and wide usage are the result of scientific control of the manufacturing process and the establishment of standard requirements and tests to insure uniformity of quality for the various grades.

In 1933 the producers, distributors, and users of Douglas fir plywood cooperated with the Bureau in establishing a commercial standard to provide definite grade specifications. It has since been necessary to revise the standard three times in order to keep it abreast of improvements.

The present edition now covers detail requirements for seven distinct grades of exterior type Douglas fir plywood which is suitable for permanent exterior use, and includes requirements for those grades of the moisture-resistant type which were previously covered by the 1938 edition.

For those unfamiliar with the product, a chart is included showing the types and grades that are generally suitable for a large list of uses, and suggestions are given on how to order plywood so as to prevent misunderstandings. The pamphlet also shows facsimiles of the markings employed by members of the Douglas Fir Plywood Association to denote and identify the several kinds and types.

Printed copies of the Commercial Standard are available from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 5 cents each.

SIMPLIFIED PRACTICE RECOMMENDATION FOR METAL PARTITIONS FOR TOILETS AND SHOWERS

The first revision of Simplified Practice Recommendation R101, Metal Partitions for Toilets and Showers, became effective as of December 1, 1940. Designated as R101–40, it covers a simplified schedule of sizes for toilet, dressing-room, and shower enclosures, and for stock partitions, fronts, posts, etc.; and fixes gage weights for metals used in panels.

Prior to the promulgation of this recommendation in 1929, metal partitions for toilets and showers had been manufactured to suit each particular installation, with the result that many superfluous sizes were being made. To the seven stock sizes adopted as standard in the original recommendation, the current revision adds three sizes of partitions that have come to be recognized as standard, but are not stocked assembled by all manufacturers. It also specifies that panels fastened to building walls be spaced away from the wall to permit air circulation and prevent rusting of the panels, and that walls to which partitions fasten shall not be furnished with metal panels unless such are specified. Details as to the finish of enclosures have been enlarged upon, and illustrations of the types of partitions and enclosures covered by the recommendation are included. The specifications for gages of steel have been stated as minima, and a slightly heavier gage has been set as the minimum for panel sheet steel for flush-type constructions of the larger sizes.

In addition to the simplified schedule, this publication includes a brief history of the project and lists the personnel of the standing committee having charge of the recommendation, and the acceptors.

Until the printed issue is available, free mimeographed copies of the revision may be obtained from the Division of Simplified Practice, National Bureau of Standards, Washington, D. C.

NEW AND REVISED PUBLICATIONS ISSUED DURING DECEMBER 1940

Journal of Research [2]

Journal of Research of the National Bureau of Standards, volume 25, number 5, November 1940 (RP1341 to RP1345, inclusive). Price 30 cents. Annual subscription, 12 issues, $3.50.

Research Papers [2]

[Reprints from September and October 1940 Journal of Research]

RP1324. Nature of the glass in portland cement clinker. Herbert Insley. Price 10 cents.

RP1325. Improvements in the preparation of *d*-galacturonic acid. William Ward Pigman. Price 5 cents.

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[2] Send orders for publications under this heading only to the Superintendent of Documents, Government Printing Office, Washington, D. C. Subscription to Technical News Bulletin, 50 cents per year; Journal of Research, $3.50 per year (to addresses in the United States and its possessions, and to countries extending the franking privilege); other countries, 70 cents and $4.50, respectively.

RP1327. Permeability of elastic polymers to hydrogen. Theron P. Sager. Price 5 cents.

RP1328. Electrode potential measurements as a means of studying the corrosion characteristics of wrought aluminum alloys of the duralumin type. Hugh L. Logan. Price 5 cents.

RP1329. An improved radio sonde and its performance. Harry Diamond, Wilbur S. Hinman, Jr., Francis W. Dunmore, and Evan G. Lapham. Price 10 cents.

RP1330. Integrating circuit for vapor-type Geiger-Müller counters. Leon F. Curtiss. Price 5 cents.

RP1331. Decomposition of rocks and ceramic materials with a small amount of sodium carbonate. James I. Hoffman. Price 5 cents.

RP1332. Thickness of a liquid film adhering to a surface slowly withdrawn from the liquid. Francis C. Morey. Price 5 cents.

RP1333. Determination of nonvolatile matter and the calculation of "cut" of shellac varnish. Charles C. Hartman. Price 5 cents.

RP1334. Method for determining the moisture condition in hardened concrete. G. Rupert Gause and John Tucker, Jr. Price 5 cents.

RP1335. Note on the effects of cobalt and nickel in storage batteries. George W. Vinal, D. Norman Craig, and Clarence L. Snyder. Price 5 cents.

RP1336. Measurement of electrode potentials and polarization in soil-corrosion cells. Robert B. Darnielle. Price 5 cents.

RP1337. Effects of drying conditions on properties of textile yarns. James G. Wiegerink. Price 5 cents.

RP1338. Reaction of silk fibroin with diazomethane. Henry A. Rutherford, Wilbur I. Patterson, and Milton Harris. Price 5 cents.

RP1339. Calibration of thermocouples at low temperatures. Russell B. Scott. Price 5 cents.

Building Materials and Structures Reports[2]

[Persons who wish to be notified of new publications in the Building Materials and Structures series as soon as they are available should write to the Superintendent of Documents, Government Printing Office, Washington, D. C., asking that their names be placed on the special mailing list maintained by him for this purpose.]

BMS55. Effects of wetting and drying on the permeability of masonry walls. Cyrus C. Fishburn. Price 10 cents.

BMS56. A survey of humidities in residences. Thomas D. Phillips. Price 10 cents.

BMS57. Roofing in the United States—Results of a questionnaire. Leo J. Waldron and Hubert R. Snoke. Price 10 cents.

BMS59. Properties of adhesives for floor coverings. Percy A. Sigler and Robert I. Martens. Price 10 cents.

BMS62. Structural properties of precast joist concrete floor construction sponsored by the Portland Cement Association. Herbert L. Whittemore, Ambrose H. Stang, and Douglas E. Parsons. Price 10 cents.

Simplified Practice Recommendations[2]

R76–40. Ash handles. (Supersedes R76.) Price 5 cents.

R118–40. Abrasive grain sizes. (Supersedes R118–36.) Price 5 cents.

Commercial Standards[2]

CS45–40. Douglas fir plywood. (Supersedes CS45–38.) Price 5 cents.

CS81–41. Adverse-weather lamps for vehicles (after market). Price 5 cents.

CS82–41. Inner-controlled spotlamps for vehicles (after market). Price 5 cents.

CS87–41. Red electric warning lanterns. Price 5 cents.

CS89–40. Hardwood stair treads and risers. Price 5 cents.

Technical News Bulletin[2]

Technical News Bulletin 284, December 1940. Price 5 cents. Annual subscription, 50 cents.

MIMEOGRAPHED MATERIAL

Letter Circulars

[Letter Circulars are prepared to answer specific inquiries addressed to the National Bureau of Standards and are sent only on request to persons having definite need for the information. The Bureau cannot undertake to supply lists or complete sets of Letter Circulars or send copies automatically as issued.]

LC611. Sources of radio information. (Supersedes LC578.)

LC613. Automobile engine lubricating oils. (Supersedes LC407.)

LC614. Radio transmission and the ionosphere. (Supersedes LC575.)

LC615. Distance ranges of radio waves. (Supersedes LC317).

LC618. Export trade expansion and retension through certification of quality. (Supersedes LC605.)

[2] See footnote on page 8.

RECENT BUREAU ARTICLES APPEARING IN OUTSIDE PUBLICATIONS [2]

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Upper limit of temperature. F. G. Brickwedde. J. Chem. Education (20th & Northampton Sts., Easton, Pa.) 17, 543 (Nov. 1940).

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Combination of wool protein with acid and base: The effect of temperature on the titration curve. Jacinto Steinhardt, C. H. Fugitt, and Milton Harris. Am. Dyestuff Reporter 29, 607 (Nov. 11, 1940).

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Corrosion inhibitors for air-conditioning equipment. J. H. Wilson and E. C. Groesbeck. Heating and Ventilating (148 Lafayette St., New York, N. Y.) 37, No. 11, 55 (Nov. 1940).

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Effect of water content and mixing time on properties of air-setting refractory mortars containing sodium silicate. R. A. Heindl and W. L. Pendergast. Bul. Am. Ceramic Soc. (2525 N. High St., Columbus, Ohio) 19, 430 (Nov. 1940).

[2] These publications are not obtainable from the Government. Requests should be sent direct to the publishers.

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